TWO CAVES

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This paper presents results obtained from two archaeological excavations undertaken in the Mitchell-Palmer limestone belt, north Queensland. The sites were excavated in order to investigate temporal patterning in the archaeological record, and especially to obtain information on the antiquity of rock art in the region. In line with previous models of change in Aboriginal prehistory, the results indicate major changes during the mid to late Holocene. They also indicate that the rock paintings from the region may largely date to the last 3500 years, whereas the peckings may be older. □ *Australian prehistory, rock art, north Queensland, intensification, cave paintings, rock engravings.*

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In 1983, Lourandos argued that, in many parts of Australia, major social and cultural changes took place during the mid to late Holocene. Amongst other things, archaeological evidence for these changes include significant increases in deposition rates of cultural materials within individual sites, increases in the number of occupied sites in the landscape, a broadening of resource exploitation strategies (including diet breadth), and major changes in stone artefact technologies. Together, it has often been suggested that these points implied major increases in intensities of site and regional land use (e.g. Hughes & Lampert, 1982). What has been lacking, however, is data to determine the relationship of the separate regional sequences, so as to enable an investigation of the dynamics of structural phenomena, such as inter-regional relations, alliance systems and exchange networks. It is these issues, it is argued, that would enable us to better understand the social contexts of the archaeological changes documented so far.

This paper emanates from these concerns. It presents the results of two archaeological excavations undertaken in the Mitchell-Palmer limestone belt, north Queensland, forming part of a broader research program focusing on the dynamics of socio-cultural (inter-regional) relations during prehistory. In order to investigate socio-cultural structure in prehistory, rock art has been the object of enquiry. Rock art is treated as governed by socio-cultural conventions, so that by investigating continuities and discontinuities in the distribution of rock art through space and time, socio-cultural patterning is itself being investigated. To shed light on such patterns, a number of sub-regions within north Queensland have been systematically surveyed for rock art sites, thereby enabling an investigation of spatio-temporal trends in rock art conventions.

This paper is a contribution towards these investigations. In order to determine the antiquity of the art, a number of rock art sites were excavated. These excavations enabled the recovery of in situ pieces of pigment (the by-products of artistic endeavours), as well as information on other temporal trends (e.g. stone artefact deposition rates). Together, these data have contributed significantly to our understanding of change and stability in the region.

The aims of this paper are thus to report on excavations undertaken at Hearth Cave and Mordor Cave. In presenting the data obtained from these excavations, broad trends will be revealed, trends that are consistent with those obtained from other sites in north Queensland (David, in prep.).

THE MITCHELL-PALMER LIMESTONE BELT

The Mitchell-Palmer limestone belt consists of a 60km long and 5km wide belt of karst towers (Fig. 1). Caves are abundant throughout the limestone (Fig. 2), two of which were excavated by the author in 1989 (Mitchell River Cave and Hearth Cave). Mordor Cave, located in the Mordor North Tower, was excavated by one of us (BD) in 1991. In all cases, excavation followed the Johnson (1979) method of bucket-spits. All

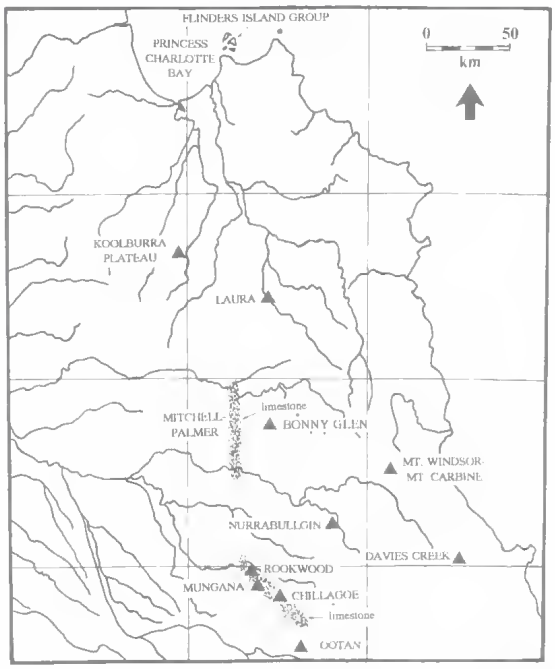

FIG. 1. Southeast Cape York Peninsula, showing location of the Mitchell-Palmer limestone belt in relation to other areas where rock art has been recorded. Arrow points to magnetic north.

cultural materials 2cm maximum size were plotted in three dimensions, and all other materials were sieved in 3mm-mesh sieves. As the results from Mitchell River Cave have already been presented elsewhere (David, 1991a), this paper only documents the Mordor Cave and Hearth Cave data.

TABLE 1. Number of paintings and stencils, Mordor Cave.

FIGURATIVE PAINTINGS		
Anthropomorphs:	vertical	204
	diagonal	8
	upside-down	6
	horizontal	2
Bats		30
Dog		11
Boomerang		3
Pig		1
Crocodile		1
TRACK PAINTINGS		
Bird		4
NON-FIGURATIVE PAINTINGS		
Geometric		22
Other linear		4
Grid		2
Infilled area		2
STENCILS		
Hand		10
Boomerang		1

MORDOR CAVE

Mordor Cave is a large limestone cave with an uneven, rocky floor located 12 km north of the Mitchell River. It was first rediscovered by L. Pearson on the 17 June 1979, when the Chillagoe Caving Club undertook speleological explorations in the Mitchell-Palmer limestone belt. Mordor Cave was described by the Chillagoe Caving Club Inc. (1988: 43) as having

> 'three large entrances interconnected with twilight and dark zones linking them horizontally. A peripheral system with some excellent decoration. Aboriginal paintings are executed on walls in mono- and bichrome silhouettes. There are over 140 individual paintings of human figures, dingoes, emus, bats and crocodiles. A pool of water would have served for ochre preparation. Some hand stencils and some inverted figures.'

The main entrance to the cave involves a moderate climb up boulder-strewn pediments, followed by a descent onto a flat floor located near the back wall. It is here that the only occurrence of soft, ashy deposits is located (Fig. 5). On the cave wall are 300 paintings and 11 stencils, most of which are monochrome infilled and red in colour (Table 1, Figs 3, 4). A number of roof collapses give entry to deep caverns along both ends of the cave. Two edge-ground axes and a stone flake were found amongst collapsed material which can be reached by a short walk through pitch-black corridors in these caverns. It is possible, however, that the artefacts were thrown into the collapsed chambers from the skylit chamber above (that is, the main chamber containing the soft ashy deposits).

Mordor Cave was excavated mainly because of

FIG. 2. Limestone karst tower, Mitchell-Palmer limestone belt.

FIG. 3. Mordor Cave, painting of a pig.

FIG. 4. Mordor Cave, main painted panel.

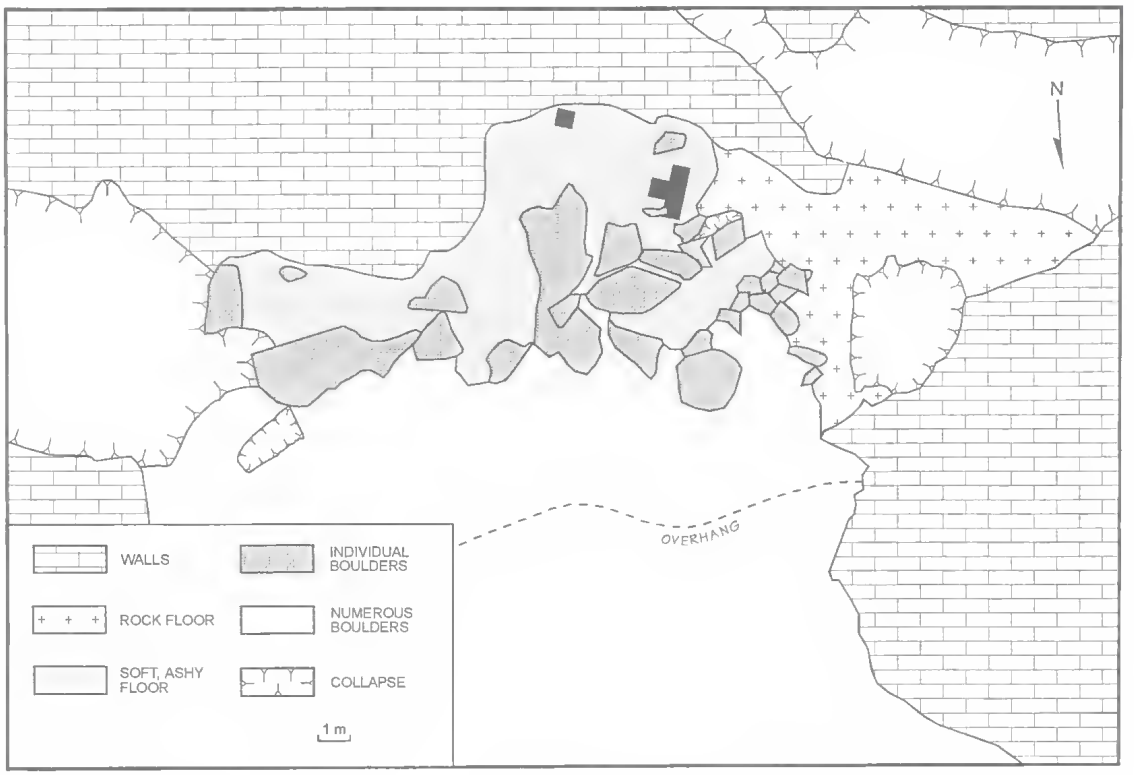

FIG. 5. Mordor Cave, site plan. The arrow points to magnetic north. The excavation squares are represented in infill; Square E18 is the isolated square, and H10 is the centre square of the T-shape excavation.

the large numbers of paintings and stencils on the cave wall, immediately adjacent to soft archaeological deposits. The great numbers of paintings located within a spatially constricted area near soft deposits were deemed to offer great potential for the recovery of in situ ochres, offering the possibility for dating the art by association with dated, in situ ochres. Two test excavations were undertaken in the soft ashy deposits. Square E18 consists of a single 50cm × 50cm pit located near the centre of the soft deposits, where sediments appear to be at their deepest in this part of the site. The main excavation was undertaken 3.5m from square E18, and consists of squares G10, H10, H11 and I10. Square H10 was initially chosen for excavation because it was located in what appeared to be the deepest part of the site. Squares E18, G10 and H10 were excavated to bedrock, while squares H11 and I10 were only partly excavated in order to enable access into adjacent squares G10 and H10. In total, 1.25m^2, or 2.0% of the 66m^2 of soft ashy floor, were excavated. All excavated sediments were very dry at the time of excavation. At some distance from the ashy deposits, closer to the dripline, large lag deposits indicate the existence of drip points and seasonal pools of water.

The excavated materials from squares E18 and H10 have been sorted and analysed and are presented here.

TABLE 2. Stratigraphic Units (SUs) from Mordor Cave, square E18.

SU	pH	Dry	Munsell	Description
1	8.5	10YR	6/2	Surface sediments, grey in colour and ashy in composition. It is loose and appears to be very disturbed. No vegetation appears on the surface.
2	8.5	10YR	6/2	Ashy sediments whose texture is similar to SU1, but with a moderate compaction. Sediments show no evidence of disturbance. No internal stratification is evident.
3a	8.5	2.5YR	3/2	Very dark, black, charcoal-rich sediments with patches of white ash.
3b	7.5	10YR	5/4	Brown silty deposits with a high charcoal content. Very rich in vegetation. Vegetation appears horizontally bedded immediately above the bedrock.

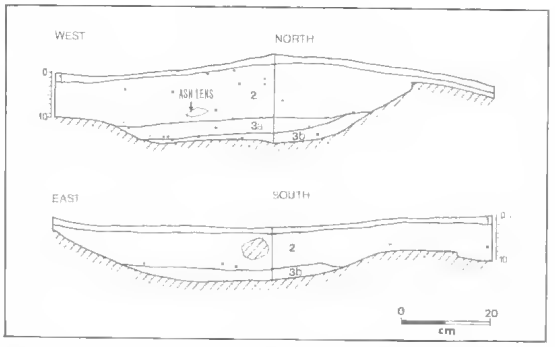

FIG. 6. Mordor Cave, Square E18 stratigraphy. The dots represent pieces of charcoal.

Square E18

Square E18 is well stratified, containing three Stratigraphic Units (SUs), SU3 being further subdivided into two sub-layers (Table 2 & Fig. 6). All stratigraphic units are well defined. Excavation proceeded in seven Excavation Units (XUs), the average thickness of which was 2.6cm.

Square E18 is 20.0cm deep. A single radiocarbon date was submitted from XU7, immediately above bedrock. A radiocarbon date of 1640±70 BP (Beta-46090) was obtained, with a $\partial^{13}C$ value of -28.4‰. The $\partial^{13}C$-adjusted age of 1580±70BP is taken to date the beginnings of occupation in this part of the site.

Table 3 presents a complete list of materials recovered from E18. The fauna is listed in Table 4. In Table 5, the raw data have been converted to deposition rates per m^2 per centimetre of deposit, to enable comparisons of deposited materials by XU. Because only a single date was obtained from square E18, the time frames covered by each spit could not be calculated. Therefore, deposition 'rates' were obtained by calculating the amounts of material recovered per m^2 per centimetre of deposit. These deposition 'rates' are graphed in Fig. 7.

SU1, represented by XU1, contains relatively low amounts of charcoal, bone, land snails, stone artefacts, eggshell, mussel shell and ochre. The proportion of burnt eggshell is also low. Compared with underlying SU2, the sediments contain large amounts of organic material (especially twigs and bark), and compaction is relatively low (as measured by weight per volume). These findings are not surprising given that, firstly, the site is not believed to have been occupied during the last 100 years, and secondly, that the surface sediments were very loose during excavation.

SU2, represented by XUs 2-5, contains large numbers of stone artefacts, land snails, eggshell, mussel shell, ochre, charcoal and burnt earth. Quantities of all cultural materials are relatively low towards the lower boundary of SU2. This may indicate that a hiatus is represented at the SU3-SU2 boundary, or that XU5, the lowermost XU from SU2, should be treated as an interface between SU3 and SU2. This interface should be treated as comprising of intermixed SU3 and SU2 materials.

SU2 contains relatively compact sediments and relatively low amounts of organic materials (mainly vegetation), except for XU5. Here, the organic content is similar to that from underlying SU3a. This further re-enforces the likelihood that XU5 contains materials from the underlying stratum.

SU3a is represented by XU6. It is rich in stone artefacts and bone, but relatively poor in all other cultural materials. Sediments are very compact

TABLE 3. List of materials excavated from Mordor Cave, Square E18.

XU	SU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	1	395	6.5	7.0	127.5	264.3	1.9	3.9	0.25	2.8	76.1	33.3	30	5.9		0.20	1.6	7		0.6	56	8.5	670	4	
2	2	276	4.5	5.0	164.7	131.7	2.2	1.8	0.25	2.9	25.5	20.6	10	2.8	1	0.28				0.2	8	5.6	348		
3	2	675	6.3	6.0	358.4	100.0	4.3	2.1	0.24	2.9	69.3	16.8	23	58.0		2.52	1.1		1	0.2	28	9.9	648	4	1.1
4	2	216	5.3	5.0	324.9	129.9	1.4	2.8	0.23	9.5	48.5	31.8	10	13.7		1.37	21.9	1		0.2	20	6.0	412		
5	2	313	5.0	5.0	190.8	231.4	1.2	2.3	0.22	1.7	22.4	29.0	19	12.9		0.68	1.3	1		0.3	21	2.9	198		78.6
6	3a	208	5.3	3.5	111.1	160.7	0.8	2.4	0.18	0.3	14.6	28.6	37	27.2		0.74				0.5	42	0.6	59		
7	3b	37	0.8	1.0	67.7	53.2	0.2	2.9	0.13		4.1	4.5	27	8.8		0.33				0.1	2	0.1	3	1	

1=residue >3mm (g); 2=sediments excavated (kg); 3=sediments excavated (litres); 4=charcoal (g); 5=other organics (g); 6=land snail (g); 7=mean thickness of XU (cm); 8=area excavated (m^2); 9=mussel shell (g); 10=burnt earth (g); 11=bone (g); 12=flaked stone artefacts (#); 13=flaked stone artefacts (g) 14=fungus (#); 15=mean weight of flaked stone artefact (g); 16=ochre (g); 17=ochre showing no use-wear (#) (all are red); 18=ochre showing use-wear (#) (red); 19=burnt egg shell (g); 20=burnt egg shell (#); 21=unburnt egg shell (g); 22=unburnt egg shell (#); 23=seeds (#); 24=burnt stone (g).

TABLE 4. Mordor Cave faunal remains: Minimum Numbers of Individuals (MNI), Square E18 (after Dagg, 1992). Question marks indicate the presence of identified species which are believed to be post-depositional intrusions into that unit (for reasons outlined in Dagg, 1992). P=present.

Species	SU1	SU2	SU3a	SU3b	Total
Macropus agilis	1	1	?	0	2
Petrogale sp.	1	2	2	?	5
Trichosurus vulpecula	1	?	1	?	2
Peramelidae	1	1	?	0	2
Macropus gigas	0	1	0	0	1
Uramys caudimaculatus	1	2	0	1	4
Other Muridae	3	9	1	1	14
Canis familiaris	0	1	0	0	1
Agamidae	0	1	0	0	1
Scincidae	0	4	0	0	4
Boidae	0	1	0	0	1
Teleostomi	3	3	1	0	7
Velesunio sp.	P	P	P	P	
Xanthomelon sp.	P	P	P	P	
Alectura lathami egg	P	P	P	P	

and contain very high amounts of vegetation. The percentage of burnt eggshell is very high.

SU3b (XU7) contains low amounts of all cultural materials except for stone flakes. Sediments are not as compact as overlying SU3a, and their organic content is low. The percentage of burnt eggshell is very high.

The part of Mordor Cave represented by Square 18 is interpreted as having been first occupied approximately 1500 years ago. At that time, occupational intensities were low. During SU3a times, large amounts of organic material, including bark and twigs, were laid horizontally on the cave floor. This layer is well defined, and associated with a low deposition 'rate' of all cultural materials, except for stone artefacts and bone. Stone artefacts are very small, averaging 0.7g. These factors indicate that the sediments recovered from SU3a may have been a sleeping mat, and that during this time the area was used as a sleeping area. It is therefore possible that contemporaneous materials from other parts of the cave would reveal complementary, specialised activity areas, such as hearths and stone artefact manufacturing areas.

During SU2 times, Square E18 witnessed relatively intensive deposition of cultural materials. It is during this time that most of the paintings on the walls were probably undertaken, as indicated by peak ochre deposition rates during this time. Fires lit during SU2 times may have caused the high proportions of burnt eggshell in XU6 and XU7 underneath. As eggs cannot be roasted directly on a fire (or they would shatter or explode; L. Hughes, pers. comm., 1992), burnt fragments of eggshell are likely to represent subsequent burning by overlying hearths.

The well preserved sediments also contain one large bracket fungus (Fig. 8). It is a single sporocarp of a member of the order Aphyllopharoles, family Polyporaceae. It is probably from the genus *Polyporus*, and possibly *P. udus* (P. Bostock & C Young, pers. comm., 1992). The dryness of the cave, and the compaction of the sediments, indicate that it could not have grown in the deposits, but must have been introduced into the cave. Such fungi are known to have been eaten by Aborigines in north Queensland during ethnographic times.

SU1 times include the post-contact period, including the recent period when the site was abandoned. Consequently, the low densities of cultural materials during this time are not surprising.

Square H10

Square H10 is 114.5cm deep, containing four distinct Stratigraphic Units, some of which are further sub-divided into a number of sub-units (Fig. 9). The SUs are described in Table 6.

TABLE 5. Mordor Cave, Square E18: deposition rates (per m^2 per cm of deposit), and proportions of burnt eggshell.

XU	SU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1	6.7	6.1	1.95	130.8	78.1	30.8	6.1		7.2	1.6	2.9		271.1	744.6	9.3	6.6	4.1	34.2
2	2	10.0	5.8	4.89	366.0	56.7	22.2	6.2				6.4	2.2	292.6	791.1	12.9	3.4		45.8
3	2	12.5	9.7	8.53	711.1	137.5	45.6	115.1	2.2	2.0	2.2	5.8		198.4	1341.3	20.0	2.0	7.9	33.3
4	2	8.3	3.9	2.17	504.5	75.3	15.5	21.3		1.6	34.0	14.8		201.7	670.8	9.6	4.6		49.4
5	2	9.9	5.9	2.37	377.1	44.3	37.5	25.5	155.3	2.0	2.6	3.4		457.3	235.2	6.3	9.4		57.3
6	3a	12.3	3.8	1.85	257.2	33.8	85.6	63.0				0.7		372.0	233.8	2.6	45.5		66.2
7	3b	2.1	4.4	0.53	179.6	10.9	71.6	23.3						141.1	13.3	0.5	50.0	2.7	11.9

1=sediments excavated (kg); 2=% residue >3mm; 3=land snail (g); 4=charcoal (g); 5=burnt earth (g); 6=flaked artefacts (#); 7=flaked artefacts (g); 8=burnt stone (g); 9=ochre (#); 10=ochre (g); 11=mussel shell (g); 12=fungus (#); 13=other organics (g); 14=egg shell (#); 15=egg shell (g); 16=% egg shell burnt (by weight); 17=seeds (#); 18=bone (g).

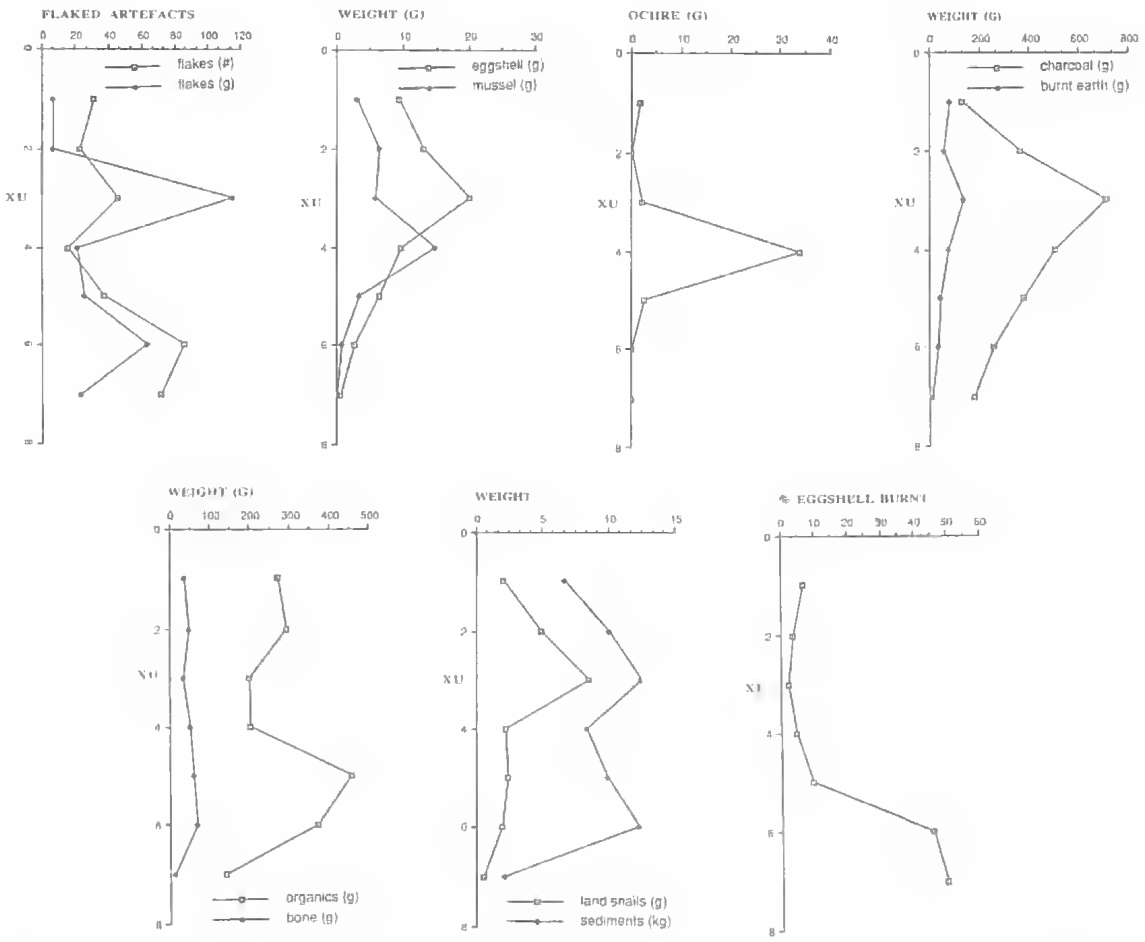

FIG. 7. Mordor Cave, Square E18, deposition rates (per m^2/cm of deposit) and proportions of burnt eggshell.

Two radiocarbon dates were obtained from Square H10 : 980±60BP (Beta-46317), located 84.7cm below the ground surface, in XU25 (SU4). The $\partial^{13}C$ value equals -27.6‰, and the ^{13}C-adjusted age is 940±60BP; and 850±50BP (Beta-46318), located 114.0cm below the ground surface in XU28 (SU4). The $\partial^{13}C$ value equals -28.2‰, and the ^{13}C-adjusted age is 800±50BP.

The two radiocarbon dates are similar and overlap at two standard deviations. They are taken to confirm the impression gained during excavation, that SU4 is an archaeologically instantaneous event.

Square H10 was excavated in 28 spits, XU10 of which was excavated in three sections (XUs 10a, b & c). Table 7 documents the amounts of materials excavated from square H10. Table 8 presents the deposition 'rates' as calculated per m^2 per centimetre of deposit (Fig. 10), while Table 9 lists the fauna identified from square H10.

SU1: this unit consists of XU1 and XU2. It contains relatively large amounts of charcoal, burnt earth, stone artefacts, mussel shell, eggshell, seeds and other vegetation. In short, SU1 represents a peak in deposition rates of a number of cultural materials.

SU3: this unit consists of XUs 3-6. It contains varying but relatively low amounts of cultural materials. XU7 is an interface between SU3 and SU4.

SU4: this unit consists of XUs 8-28. The lowermost seven XUs (23-28) are from SU4h, which appears to be a localised variant of SU4, containing leaves and seeds amongst a rich vegetation (especially bark and twig) matrix. Leaves do not occur above XU22. Whilst SU4 contains similar amounts of cultural materials to SU3, SU4h contains significantly higher amounts of bone and a greater proportion of burnt eggshells, with ochre and pandanus nuts occurring exclusively in this

FIG. 8. Bracket fungus found in XU2, Square E18, Mordor Cave (scale in 2mm units).

unit. Amounts of charcoal are more variable between XUs of SU4h than is the case in SU4 proper above it. SU4h sediments contain a relatively high proportion of sediments over 3mm in minimum size, although stone artefacts are very rare. Interestingly, XUs 20-21, located near the boundary of SU4 and SU4h, contain 98.2% of the burnt stone recovered from Square H10. Given that relatively high percentages of burnt eggshell, as well as consistently high amounts of charcoal and burnt earth also appear in this part of the excavation, SU4 and SU4h may be related to a hearth. This is also supported by the fact that some of the vegetation making up the organics from SU4 is partly burnt. SU4 and SU4h may therefore represent materials dumped when a cooking hearth was emptied to retrieve the cooked food. However, while this explanation would explain the 'instantaneous' appearance of the deposits and the burnt material, it does not account for many of the cultural remains within SU4/4h (see below).

A number of wooden objects, including a digging stick (from XU22) and a large sheet of cut bark containing a number of pandanus nuts around and on top of it (XU25), were also located within SU4 (Fig. 11). A grinding stone with two ground surfaces was also recovered from XU 26. All of the ochre (3 white pieces, totalling 1.4g), none of which contained use-striations, came from XU25 and XU27. A fig (*Ficus virens* var *sublanceolata*, *F. obliqua*, *F. platypoda*, *F.*

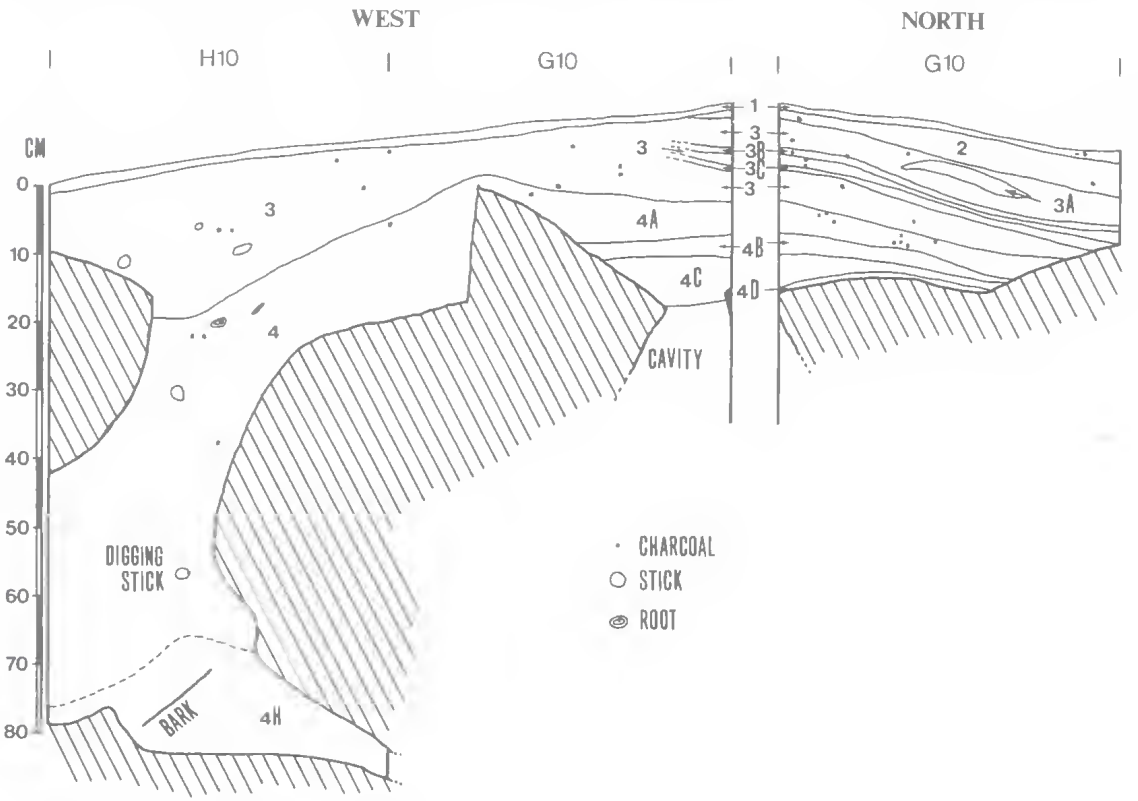

FIG. 9. Mordor Cave, Square H10 stratigraphy.

TABLE 6. Stratigraphic Units (SUs) from Mordor Cave, square E18.

SU	Dry	Munsell	Description
1	10YR	6/2	Loose, disturbed, grey, ashy.
2	10YR	6/2	Some vegetation present especially in some parts of Square G10. Brownish-grey in colour. Ashy and moderately compact.
3	10YR	6/2	Ashy, grey
3a	10YR	6/2	Localised lens of vegetation.
3b	10YR	6/3	Well-defined, fairly compact.
3c	10YR	6/3	Well-defined, fairly compact
4	10YR	5/3	Very rich in vegetation. This unit contains very little sediment apart for the matted vegetation
4a	10YR	6/3	Dark grey vegetation sub-layers.
4b	10YR	5/3	A grey vegetation sub-layer.
4c	10YR	6/3	Dark grey vegetation sub-layers.
4d	10YR	3/1	A grey vegetation sub-layer.
4e	10YR	6/3	Dark grey vegetation sub-layers.
4f	10YR	6/2	A grey ashy unit.
4g	10YR	7/2	A grey vegetation sub-layer.
4h	10YR	5/4	A brown vegetation unit

racemosa, *F. opposita* or *F. coronulata*; P. Bostock, pers. comm., 1992) was also retrieved from XU23. The fruit contains the dried, soft tissue, and shows no evidence of fully developed seeds (Fig. 12). All of these items come from SU4h or the SU4-SU4h interface zone, indicating that SU4h may have been a different depositional unit to SU4. Coupled with the fact that all of the pandanus nuts and leaves also come from this unit, SU4h is interpreted as having been laid immediately before SU4 was deposited. This took place sometime around 900 years BP. The most parsimonious explanation for SU4/4h may thus be that the vegetation-rich SU4h was laid together as a single unit. This involved wedging vegetation between boulders devoid of underlying sediments, thereby creating a localised 'false floor'. The digging stick, sheet of cut bark, and the pandanus nuts were then placed on top of this matted vegetation layer, and the whole lot was then covered with more vegetation (containing some hearth remains). The reasons for this are unknown, but ethnographic parallels are known from the Mitchell River delta (pers. obs., 1992). Here, Aboriginal people are known to bury people's 'rubbish' (including cherished material items) after their death. It is possible that the Mordor Cave SU4/4h layer relates to a similar practice, although this is, at this stage, mere speculation.

Discussion of Mordor Cave

An interesting parallel between both Squares E18 and H10 is the large amount of vegetation recovered from the excavations. Especially important is the presence of a bracket fungus from XU2 of Square E18, and a fig from XU23 of Square H10 (dated to approximately 900BP). The very large numbers of Brush Turkey *(Alectura lathami)* eggshell recovered from both squares and from all SUs may also indicate that the site was used on a seasonal basis, and that it was repeatedly re-occupied during the same time of the year (August-December). 2515 fragments of eggshell were excavated from square E18, and 2340 pieces from square H10, distributed throughout the excavated sequences. A single Brush Turkey feather was also recovered from H10 XU3 (Fig. 13).

It is difficult to relate the E18 stratigraphy to that of H10 given the insufficient number of radiocarbon dates obtained. Nevertheless, the peak occurrence of ochre half-way through the deposit in Square E18, whose base was dated to 1500BP, equates well with peak ochre deposition rates around 900BP in Square H10, and may indicate that most of the paintings at the site were undertaken around that time. There is no evidence for any rock art activity at the site having been undertaken before approximately 1500BP. Nevertheless, the presence of a painted pig indicates that cave painting continued into contact times.

HEARTH CAVE

Hearth Cave is located towards the northern end of the Mitchell-Palmer limestone belt, 9km south of the Palmer River. It was recently rediscovered during speleological explorations by the Chillagoe Caving Club, who report (1988:62):

> Located on 01/04/83 by M. Andersen on north eastern end of tower .... A phreatic slot leading back into tower, 3m wide at entrance. Floor is moss and fern covered. Slot develops to the rear far enough to provide shelter from rainfall. In the small narrow section at the back is a significant ash pile, 2m by 2m and 200mm to 300mm higher than the rest of the floor. Eroded sections of this floor shows evidence of broken bones, a possible kitchen midden.
>
> The walls have a number of Aboriginal paintings, some superimposed on each other on the left hand wall. Observed were a boomerang in white and other paintings vertical scrapings with small numbers at lesser angles. They have been apparently made by someone standing, as they are in easy reach at waist level to hand outstretched in height. Exposure is 2m long by 1m high. Right hand side has scrapings, 12 or so scratches but nothing of real significance. Cave is an archaeological site.

Subsequent recording of the site revealed a greater number of paintings and engravings than initially outlined by the Chillagoe Caving Club,

TABLE 7. List of materials excavated from Mordor Cave, Square H10.

XU	SU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28
1	1	279	4.7	5	103.0	148.2	1.7	0.7	0.25	8.6	61.8	16	20.2				0.3	13	1.4	109	1								
2	1	97	1.7	2	36.4	135.3	1.0	0.3	0.25	0.5	17.3	3	0.4				0.1	10	0.4	46	3								
3	3	393	6.3	6	255.0	158.2	5.1	1.9	0.25	1.4	64.5	22	3.5				0.3	28	2.5	185									
4	3	386	5.7	6	106.1	188.6	3.9	1.8	0.25	1.2	27.4	6	7.5				0.4	26	1.5	137									
5	3	339	6.2	7	124.2	255.6	2.8	2.7	0.25	1.7	53.1	7	1.7				0.2	24	2.4	173	4								
6	3	554	7.6	8	234.0	220.0	6.3	2.9	0.25		60.6	9	7.9	1			0.1	20	4.0	238	4								
7	3/4	481	7.0	7	188.6	178.6	4.0	3.2	0.25	1.6	59.8	20	5.4				0.2	17	3.5	216		2.1							
8	4	371	4.6	7	94.2	240.8	3.9	1.8	0.23	2.6	48.6	13	3.6				0.1	9	2.5	146	1			1					
9	4	159	3.2	3	111.7	155.4	3.3	4.0	0.19	1.3	32.7	3	0.3				0.1	13	1.4	99	1								
10a	4	157	2.7	3	52.6	119.4	2.6	4.1	0.09	0.8	25.9	9	2.1				0.1	8	1.4	83									
10b	4	13	0.3	1	16.4	69.6	0.1	2.8	0.01	1.5	3.9	1	0.4						<0.1	1	4								
10c	4/4f	25	0.5	1	16.1	21.3	0.1	2.9	0.03	0.4	5.9	1	0.2				0.1	6	0.2	8	1								
11	4	199	3.6	4	60.9	213.3	3.5	2.5	0.14	0.7	49.0	6	2.4				0.1	10	1.5	93	2								
12	4	209	3.5	4	85.3	390.6	1.2	4.5	0.12	1.0	33.2	3	1.8				0.1	6	1.7	91	3								
13	4	195	3.5	4	153.4	329.7	1.1	5.1	0.11	2.4	56.8	5	2.3				0.1	9	1.1	74									
14	4	159	3.0	4	99.0	258.4	1.3	3.8	0.10	2.4	19.6	7	5.8				0.1	10	0.8	47									
15	4	92	2.2	3	62.5	213.3	0.8	2.7	0.09	0.1	23.0	2	0.1				0.1	5	0.8	26									
16	4	107	2.5	3.5	61.8	189.8	3.4	3.5	0.09	0.5	24.9	6	2.7				0.2	10	0.4	26									
17	4	811	3.5	4.5	55.3	263.5	2.0	4.7	0.09	1.8	19.4	7	4.3				0.1	7	0.1	15									
18	4	162	2.5	4	121.0	249.8	5.9	5.2	0.09	4.5	6.6	2	0.6				<0.1	2	0.1	15									
19	4	88	1.8	3	15.2	318.6	4.9	5.4	0.07	4.5	11.0	3	3.3				<0.1	3	0.1	14									
20	4	146	2.1	5	29.9	277.8	2.8	4.5	0.07	1.3	14.8	4	0.7				0.1	5	0.2	27		36.9							
21	4	221	2.6	5	72.8	224.1	2.6	4.2	0.07	0.2	20.0	1	0.1						0.1	11	1	238.6							
22	4	405	3.3	5	101.8	326.3	3.7	8.2	0.07	2.0	14.1	3	0.1				0.1	7	0.2	29	2		1		1				
23a	4/4h	71	?	?	34.6	242.5	0.4	5.8	0.06	1.3	5.9	1	0.1		<0.1		0.1	2	0.3	17	1		2						
23b	4h	3	0.3	0.1	1.5	3.1	<0.1	1.4	0.01		0.4												1						
24	4h	227	2.8	9	94.9	456.5	0.7	3.9	0.07	0.2	13.4	1	0.1		0.6				0.4	10	2		1						2
25	4h	32	0.1	3	51.6	184.0	4.7	4.2	0.08	0.3	5.9					0.3	<0.1	1	0.3	4		2.9	1			1			
26	4h	185	4.1	9	212.3	455.9	2.9	5.5	0.16	0.7	18.2				0.2		0.1	7	1.3	54	1		5				1	610.4	4
27	4h	771	3.8	5	41.2	282.8	8.3	6.1	0.18	6.6	19.6	8	2.0			1.1	0.1	4	1.2	42	5		1						1
28	4h	280	2.5	3	36.7	210.6	1.5	12.6	0.22	3.8	14.8	2	0.6						1.1	42	2								

1=residue >3mm (g); 2=sediments excavated (kg); 3=sediments excavated (litres); 4=charcoal (g); 5=other organics (g); 6=land snail (g); 7=mean thickness of XU (cm) 8=area excavated (m^2) 9=mussel shell (g); 10=burnt earth (g); 11=flaked stone artefacts (#); 12=flaked stone artefacts (g); 13=feathers (#); 14=crustacean (g); 15=ochre (g) (XU25=2 pieces, XU27=1 piece); 16=burnt egg shell (g); 17=burnt egg shell (#); 18=unburnt egg shell (g); 19=unburnt egg shell (#); 20=seeds (#); 21=burnt stone (g); 22=leaves (#); 23=bone points (#); 24=wooden digging sticks (#); 25=sheets of cut bark (#); 26=grinding stones (#); 27=grinding stones (g); 28=pandanus nuts (#).

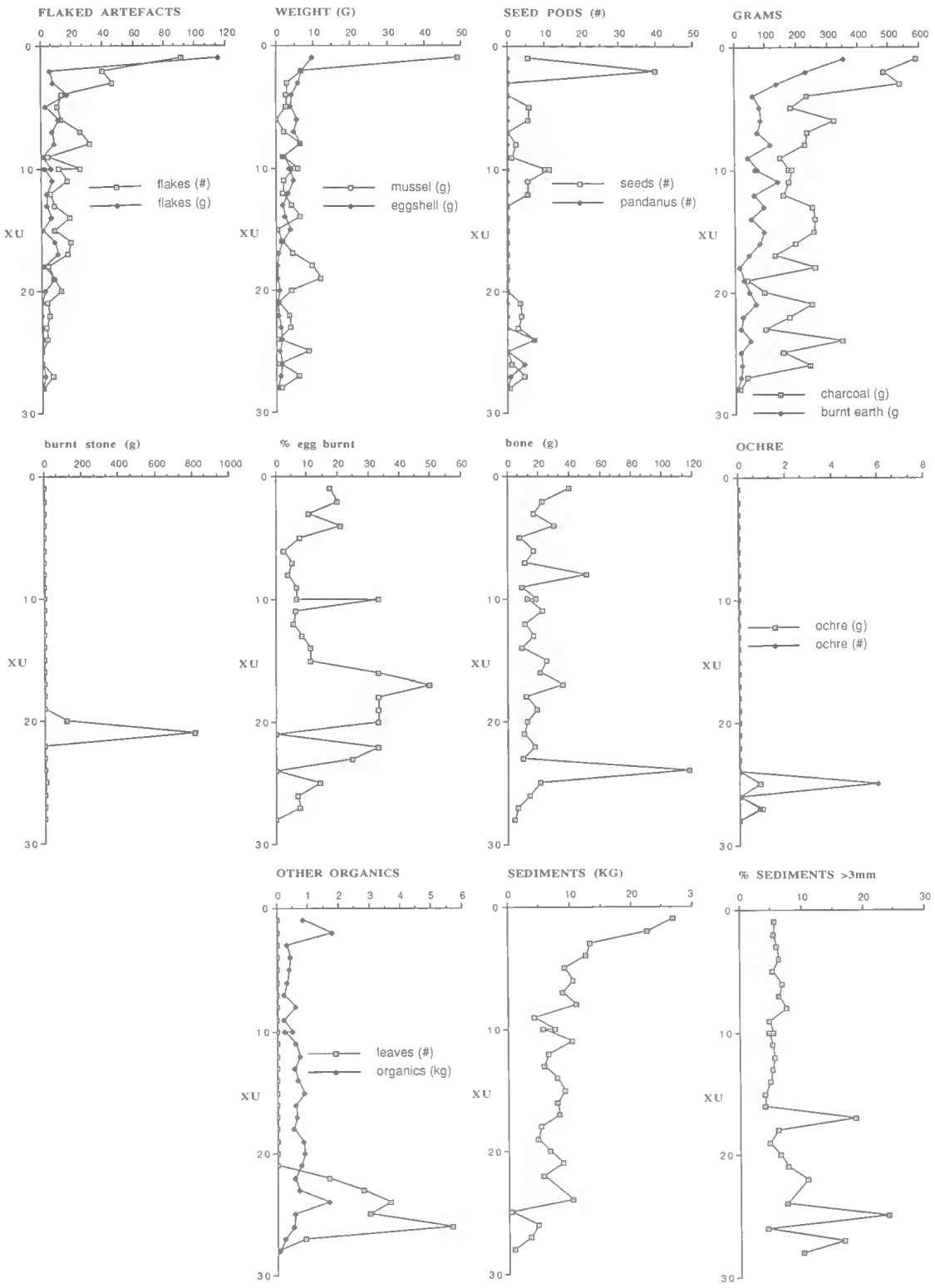

FIG. 10. Mordor Cave, Square H10, deposition rates (per m^2/cm of deposit) and proportions of burnt eggshell.

TABLE 8. Mordor Cave, Square H10: deposition rates (per m^2 per cm of deposit),and proportions of burnt eggshell.

XU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1	26.9	5.6	9.7	588.6	353.1	91.4	115.4					49.1	847	697	9.7	17.6	5.7	40.0						
2	22.7	5.4	13.3	485.3	230.7	40.0	5.3					6.7	1804	747	6.7	20.0	40.0	22.7						
3	13.3	5.9	10.7	536.8	135.8	46.3	7.4					3.0	333	448	5.9	10.7		17.1						
4	12.7	6.3	8.7	235.8	60.9	13.3	16.7					2.7	419	362	4.2	21.1		30.0						
5	9.2	5.2	4.2	184.0	78.7	10.4	2.5					2.5	379	292	3.9	7.7	5.9	7.9						
6	10.5	6.8	8.7	322.8	83.6	12.4	10.9						303	356	5.7	2.4	5.5	16.6	1.4					
7	8.8	6.4	5.0	235.8	74.8	25.0	6.8		2.6			2.0	223	291	4.6	5.4		11.3						
8	11.1	7.5	9.4	227.5	117.4	31.4	8.7					6.3	582	374	6.3	3.8	2.4	51.0						
9	4.2	4.7	4.3	147.0	43.0	3.9	0.4					1.7	205	147	2.0	6.7	1.3	9.3						
10a/b	7.6	5.4	6.8	173.8	75.1	25.2	6.3					5.8	476	232	3.8	6.7	10.1	17.9						
10c	5.7	4.7	1.2	185.1	67.8	11.5	2.3					4.6	245	161	3.5	33.3	11.5	12.6						
11	10.3	5.2	10.0	174.0	140.0	17.1	6.9					2.0	609	294	4.6	6.3	5.7	22.3						
12	6.5	5.6	2.2	158.0	61.5	5.6	3.3					1.9	723	180	3.3	5.6	5.6	11.1						
13	5.8	5.3	1.8	253.6	93.9	8.3	3.8					4.0	545	137	1.8	8.3		16.5						
14	7.9	5.0	3.4	260.5	51.6	18.4	6.1					6.3	680	150	2.4	11.1		9.2						
15	9.1	4.0	3.3	257.2	94.7	8.2	0.4					0.4	878	128	3.7	11.1		25.1						
16	7.9	4.1	10.8	196.2	79.0	19.0	8.6					1.6	603	114	1.9	33.3		21.0						
17	8.3	18.8	4.7	130.7	45.9	16.5	10.2					4.3	623	52	0.5	50.0		35.5						
18	5.3	6.1	12.6	258.5	13.9	4.3	1.3					9.6	534	36	0.3	33.3		11.8						
19	4.8	4.7	13.0	40.2	29.1	7.9	8.7					11.9	843	45	0.4	33.3		18.8						
20	6.7	6.5	8.9	94.9	47.0	12.7	2.2		117.1			4.1	882	102	1.0	33.3		12.4						
21	8.8	7.8	8.8	247.6	68.0	3.4	0.3		811.6			0.7	762	37	0.3	0.0	3.4	10.5						
22	5.7	10.9	6.4	177.4	24.6	5.2	0.2					3.5	569	63	0.5	33.3	3.5	17.2		1.7	1.7			
23	?	?	1.1	99.4	17.0	2.9	0.3					3.7	697	55	1.2	25.0	2.9	9.5		2.8		0.1		
24	10.3	7.5	2.6	347.6	49.1	3.7	0.4					0.7	1672	37	1.5	0.0	7.3	117.6		3.7		2.2	7.3	
25	0.3	24.1	14.0	153.6	17.6				8.6	6.0	0.9	8.9	548	15	1.0	14.3		21.1		3.0				3.0
26	4.7	4.3	3.3	241.3	20.7			1.1				0.8	518	69	1.6	7.1	1.1	14.0		5.7		0.2	4.6	
27	3.5	16.9	7.6	37.5	17.9	7.3	1.8			0.9	1.0	6.0	258	42	1.2	7.7	4.6	6.0		0.9			0.9	
28	0.9	10.1	0.5	13.2	5.3	0.7	0.2					1.4	76	15	0.4	0.0	0.7	4.3						

1=sediments excavated (kg); 2=% sediments 3mm; 3=land snail (g); 4=charcoal (g); 5=burnt earth (g); 6=flaked stone artefacts (#); 7=flaked stone; artefacts (g); 8=grinding stones (#); 9=burnt stone (g); 10=ochre (#); 11=ochre (g); 12=mussel shell (g); 13=other organics (g); 14=egg shell (#); 15= egg shell (g); 16=% egg shell burnt (by weight); 17=seeds (#); 18=bone (g); 19=feathers (#); 20=leaves (#); 21=wooden digging sticks (#); 22=crustacean (g); 23=pandanus nuts (#); 24=sheets of cut bark (#).

with thirteen figurative paintings, one track painting, two non-figurative peckings and 812 abraded grooves (including twelve tridents) being determined (Figs 14,15). In addition, numerous weathered peckings are evident subimposed under a series of paintings, but their quantification and precise identification could not be determined due to their advanced stage of deterioration.

Hearth Cave was chosen for excavation because of the presence of patinated peckings at the site. Non-figurative peckings similar to those found at Hearth Cave are relatively rare in the Mitchell-Palmer region, and were believed to have considerable antiquity at the Early Man site near Laura (Rosenfeld et al., 1981). Consequently, a deep sequence was anticipated from Hearth Cave. Furthermore given that paintings occur in superimposition over the peckings, the recovery of localised in situ ochre should reveal both the antiquity of the paintings and a minimum date for the peckings at the site.

Excavation, Stratigraphy and Dating

Four juxtaposed 50cm × 50cm test pits were excavated, two of which were located against the cave wall in order to determine whether or not rock art continued below the shelter floor (Fig. 16). Only one square (Test Pit 3), however, has been fully sorted and analysed, and consequently this report does not deal with data excavated from the other three squares. It is notable that preliminary analysis of the excavated material from the

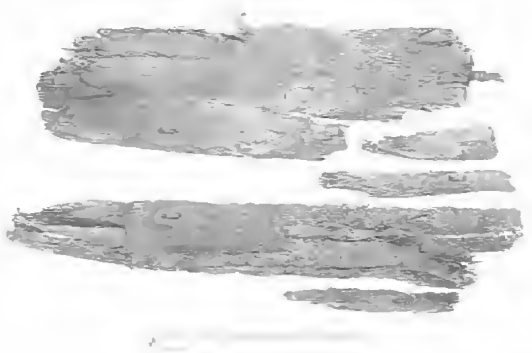

FIG. 11. Mordor Cave, large piece of cut bark excavated from XU25, Square H10.

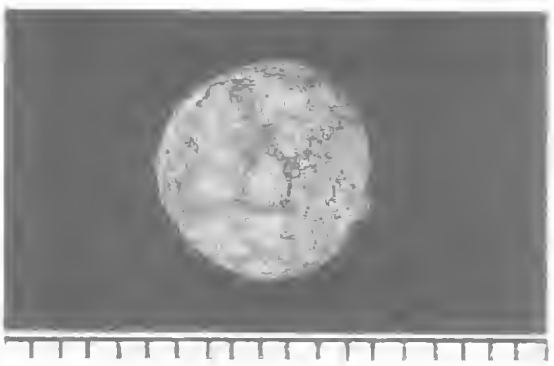

FIG. 12. Mordor Cave, fig excavated from XU23, Square H10 (scale in 2mm units).

other three squares is consistent with temporal trends observed from Test Pit 3.

Test Pit 3 revealed five stratigraphic units, the first four of which were identified during the course of the excavation (Fig. 17). SU5, the basal layer, is indistinct and was only identified whilst section-drawings were being undertaken, after the excavation was completed. The layers are described in Table 10.

Radiocarbon Dates

Four radiocarbon dates were obtained, two of which come from Test Pit 3, the other two from Test Pit 2: 2360±70BP (Wk-1716), on charcoal collected from the sieves from an excavation unit located 18.9 to 22.0cm below the ground surface. $\partial^{13}C$=-26.5‰. This date comes from near the top of SU3 in Test Pit 2; 3494±84BP (R 14023 NZA 1383). This is an AMS date obtained on charcoal from the sieves, located 36.4 to 40.0cm below the ground surface. It was obtained from slightly below the surface of SU4b in Test Pit 2. $\partial^{13}C$=-25.9‰; 4100±120 (Beta-54024), obtained on charcoal collected from the sieves. It dates excavation unit 14a (SU4b), located in Test Pit 3, 40.6 to 45.7cm below the ground surface; 21,500±250 (Wk-1719), a radiocarbon date obtained from land snails (Xanthomelon sp.) located 51.4 to 57.1cm below the ground surface (XU16a). It dates the SU4b-SU5 interface (Test Pit 3). $\partial^{13}C$=-7.2‰.

Cultural Materials

Unfortunately it is not possible to determine deposition rates for the earliest times represented by the Hearth Cave excavations, as radiocarbon dates are not available for the basal units. By assuming a *minimum* of 21,500 years of occupation, however, *maximum* deposition rates can be calculated for the earliest occupational deposits, and temporal patterns can then be explored. It is stressed, however, that the calculation of such rates are for heuristic purposes only. They are employed to determine temporal trends rather than absolute, synchronic values.

Given the uneven nature of the stratigraphic

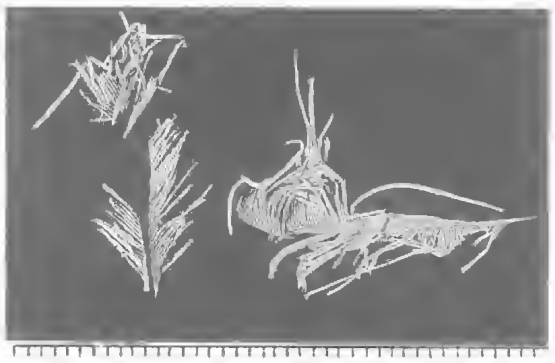

FIG. 13. Mordor Cave, feather excavated from XU3, Square H10 (scale in 2mm units).

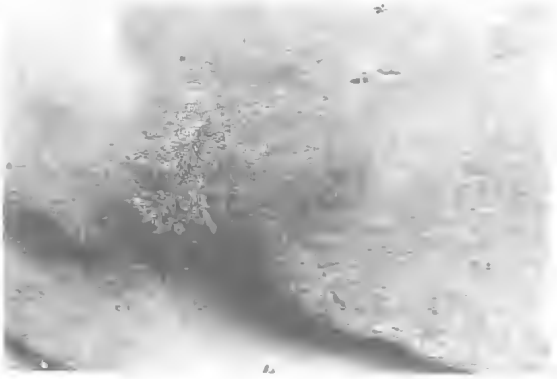

FIG. 14. Hearth Cave, rock wall showing evidence of very weathered peckings and paintings.

TABLE 9. Mordor Cave faunal remains: Minimum Numbers of Individuals (MNI), Square H10 (after Dagg, 1992). Question marks indicate the presence of identified species which are believed to be post-depositional intrusions into that unit (for reasons outlined in Dagg, 1992). P=present.

Species	SU1	SU3	SU3/4	SU4	SU4/4F	SU4/4H	SU4H	Total
Macropus robustus	0	0	0	0	0	0	1	1
Macropus agilis	0	2	0	2	0	0	1	5
Petrogale sp.	0	1	?	3	0	0	3	7
Pseudocheirus peregrinus	1	?	0	0	0	0	0	1
Trichosurus vulpecula	1	0	0	1	0	0	0	2
Peramelidae	0	1	0	2	0	0	0	3
Dasyuridae	0	1	0	0	0	0	0	1
Uramys caudimaculatus	0	0	0	2	0	0	0	2
Other Muridae	1	1	0	6	1	0	2	11
Canis familiaris	0	1	0	0	0	0	0	1
Varanus sp.	0	0	0	1	0	0	0	1
Agamidae	0	1	0	?	0	1	1	3
Scincidae	1	1	0	1	0	0	1	4
Boidae	1	0	0	1	0	0	0	2
Elapidae	0	1	0	0	0	0	0	1
Teleostomi	1	0	0	0	0	0	1	2
Velesunio sp.	P	P	P	P	P	P	P	
Crab	0	0	0	0	0	?	1	1
Xanthomelon sp.	P	P	P	P	P	P	P	
Alectura lathami egg	P	P	P	P	P	P	P	
Alectura lathami	0	1	0	0	0	0	0	1

units near the southern end of the square, especially where SU2 dips down to form a depression, the calculation of deposition rates was only attempted for those parts of the pit where strata are laid approximately horizontally. Table 11 presents the raw data excavated from Test Pit 3, whilst Table 12 transforms this data to deposition rates for each spit (excavation unit). In Table 13, a similar procedure is attempted for each stratigraphic unit.

Although occupation at Hearth Cave began sometime before 21,500±250BP, sedimentation rates peaked between approximately 3500BP and 2500BP, after which they again decreased. Deposition rates of all cultural materials show a similar pattern, being low until approximately 3500BP, and subsequently increasing until 2500-2000BP, after which they decreased slightly and remained relatively stable from then on (Tables 11,12, Fig. 18).

The Hearth Cave bone has not yet been identified to species, but it is notable that very large

TABLE 10. Stratigraphic Units (SUs) from Hearth Cave, Test Pit 3.

SU Description

1 The surface layer, consisting of loose, ashy sediments containing leaves, twigs and cultural materials.

2 Similar to SU1, but sediments are more compact. Charcoal and mussel shell are very abundant, especially immediately above SU3. Sediments are ashy silts. Unlike SU1, there are virtually no leaves or twigs in SU2. The boundary with SU1 above is marked. Towards the southern parts of the excavation, SU2 dips down, forming a depression where charcoal, burnt earth and mussel shell are particularly abundant. It is possible, but not certain, that this depression represents a hearth.

3 Extremely gravelly layer, whose boundary with SU2 above is distinct. Given the coarseness of sediments in SU3, it is thus possible that this layer represents a lag or deflated deposit. This is supported by the considerably larger mean weight of stone artefacts excavated from SU3 than from the other SUs, implying that fine sediments (including very small stone artefacts) have been washed away. Given that deposition rates of cultural materials peak during SU3 times, this may indicate that their original densities should in reality be even greater. Rootlets are common at the interface between SU2 and SU3. Cultural materials were identified in situ throughout SU3.

4a Silty clay containing very large numbers of land snails (especially *Xanthomelon* sp.). Some gravel is present, but in significantly smaller numbers than in SU3 above. SU4a is localised within Test Pit 2 only, and does not appear in Test Pit 3.

4b SU4b consists of silty clays containing cultural materials. Some very fine gravel occurs, but as was the case with SU4a, they are not as numerous as in SU3.

5 Humid clay containing numerous small calcium carbonate concretions. Although SU5 continues beyond the base of the pit, excavation was stopped because no cultural materials were noted in situ within this layer. Subsequent analysis of materials in the laboratory, however, proved that SU5 is not culturally sterile, and investigations will therefore be resumed at a later date to determine the nature of early deposits at Hearth Cave. The fact that basal occupation was not reached does not, however, affect the thrust of this paper, nor the conclusions reached here.

TABLE 11. Hearth Cave: list of materials excavated and information on sediments.

XU	SU	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22
1	1	44	39.6	129.4	161.1	3.3	4.4	26.3		12.5	41	31.0		9.5	9	4	5.9	2750	4.9	0	1.6	1.6	0.84
2	1	106	33.8	179.0	223.1	9.6	10.1	63.1		44.8	53	12.6	1	19.0	8.75	10	11.3	2750	2.8	1.6	4.9	3.3	0.32
3	1	47	34.4	53.1	13.3	3.8	1.2	28.8	40.4	22.3	24	7.0		2.3	9	5	4.7	2750	0.4	4.9	5.8	0.9	0.73
4	2	102	78.5	109.4	32.8	9.1	9.5	42.5		46.6	71	20.7		7.0	9	10	11.6	2700	1.2	5.8	9.2	3.4	0.77
5	2	119	55.6	131.7	19.4	13.1	2.6	9.4	68.4	47.0	80	92.9	1	27.4	8.5	12	12.4	2700	0.7	9.2	12.4	3.3	0.47
6	2	90	25.9	105.1	36.1	12.7	5.5	22.7		49.7	71	31.6		19.0	8.5	11	11.6	2700	1.0	12.4	15.1	2.7	0.29
7	2	104	30.0	69.0	15.0	10.3	1.3	5.2		45.6	39	8.7	3	21.8	8.5	10	11.0	2650	0.8	15.1	17.7	2.5	0.29
8b	2	13	0.8	3.6	2.5	3.0	0.4	0.5		7.8	7	0.4		2.0	8.5	5	5.3	1100	0.2	17.7	22.3	4.1	0.06
10b	2	56	10.4	35.3	67.2	7.1	1.3	7.0		16.3	22	4.4		5.4	8.5	10	10.2	1900	1.3	22.3	25.9	3.6	0.19
11b	2	30	4.4	5.6	14.4	4.4	0.4	0.2		8.1	3	0.1		1.5	8.5	6	6.0	1350	0.2	25.9	29.7	3.8	0.15
12b	2	24	4.6	8.8	43.7	6.3	0.5	0.1		8.5	16	1.3		12.2	8.5	10	11.0	1300	0.3	29.7	36.1	6.4	0.19
13b	2	21	3.0	8.9	30.7	2.3	0.1	0.1		1.6	2	0.4		3.1	8.5	6	6.6	820	0.2	36.1	40.4	4.3	0.14
14b	2	12	1.9	9.9	62.3	1.5	0.1	0.1		1.2	3	0.7		1.0	8.5	4	6.8	750	0.2	40.4	44.5	4.1	0.16
15b	2	14	2.0	5.1	33.4	1.0	0.1			0.5				5.6	8.5	5	4.5	470	0.1	44.5	50.3	5.8	0.14
16b	2	6	0.2	1.2	51.6	0.8	0.1			0.4	2	0.1		0.2	8	5	5.7	330	0.1	50.3	57.4	6.9	0.03
8a	2/3	78	25.8	37.5	52.4	4.6	0.9	4.9		26.4	26	6.1		1.4	8.5	5	4.7	1550	0.6	17.7	18.5	1.3	0.33
9	3	72	44.4	137.1	283.9	3.3	0.6	4.7		10.9	31	24.9		1.9	9	6	6.4	810	2.6	18.5	21.6	3.2	0.62
10a	3	17	47.9	102.6	377.0	1.2	0.7	1.1		3.3	16	8.6		1.2	8.5	4	5.8	850	1.8	21.6	25.3	3.7	2.82
11a	3	49	90.3	189.5	647.1	2.2	1.3	16.1		8.8	60	80.2		1.3	8.5	8	10.9	1500	1.9	25.3	29.8	4.5	1.84
12a	3	30	80.1	143.9	631.6	2.9	1.9	2.9		4.9	28	25.0		1.5	8.5	8	9.9	950	2.6	29.8	36.5	8.1	2.67
12c	3/4b	19	6.8	65.4	294.4	2.8	1.3	0.8		4.6	17	9.6		3.3	8.5	5	5.8	450	1.0	29.8	36.9	7.1	0.36
13a	3/4b	25	18.7	65.2	63.1	1.9	2.1	0.5		4.1	24	8.0		2.4	8.75	?	9.8	1800	1.5	37.3	40.6	3.3	0.75
14a	4b	3	0.1	17.9	414.4	1.3	0.1	0.4		1.1	2	0.2		0.6	9	8	9.7	1950	1.0	40.6	45.7	5.1	0.03
15a	4b/5	5	0.2	15.9	213.9	1.2	0.2	0.1		1.1	3	0.1		1.7	8.25	11	13.5	2200	1.2	45.7	51.4	5.7	0.04
16a	4b/5	38	3.5	16.3	151.2	0.7	0.1	2.2		0.2	2	1.1		0.4	8.5	12	15.4	2350	1.1	51.4	57.1	5.7	0.09
17	4b/5	2	0.1	1.7	78.7	0.2	0.1			0.1	4	0.1		0.7	8.25	12	14.0	2750	1.2	56.7	61.5	4.7	0.05
18	5	12	0.5	4.2	41.9	0.6	0.2			0.1	3	1.7		4.1	8.5	14	16.9	2750	2.1	61.5	66.6	5.1	0.04
19	5	6	0.2	0.8	36.6	0.1				0.1	8	2.4		2.4	8.25	10	11.7	1250	1.3	66.6	72.9	7.9	0.03
20	5	5	0.2	1.8	2.4	0.1	0.1				7	0.5		0.1	8.25	7	8.2	1250	0.8	72.9	78.2	5.4	0.04
21	5			0.2	0.1						1	0.1		0.1	8.25	?	3.7	625	0.6	78.2	83.4	5.2	

1=stone artefacts (#); 2=stone artefacts (g); 3=bone (g); 4=land snail (g); 5=egg shell (g); 6=mussel shell (g); 7=burnt earth (g); 8=burnt stone (g); 9=charcoal (g); 10=ochre (#); 11=ochre (g); 12=bone points (g); 13=other organics (g); 14=pH; 15=volume (litres) dug; 16=weight (kg) dug; 17=area (cm^2dug; 18=residue >3mm (kg); 19=mean start depth below surface (cm); 20=mean end depth below surface (cm); 21=mean thickness of XU (cm); 22=mean weight of stone artefacts (g).

numbers of Brush Turkey egg shell occur in all cultural layers. Brush Turkeys lay their eggs from the end of the dry to the beginnings of the wet season (August-December), offering a reliable seasonal marker for when the site was used (W. Longmore, pers. comm., 1992). Although this question needs further attention, it is possible that the repeated high numbers of egg shell at Hearth Cave implies great continuity of a seasonal settlement system whereby rockshelters from the region were repeatedly occupied during the wet season. This does not deny the possibility, however, that the site was also used during other times of the year. Further research into this issue will have to await systematic investigation of the faunal material from Hearth Cave and elsewhere, as well as investigations in other sites from the region (including both rockshelter and open sites).

The stone artefacts are largely 'amorphous', although technologically they may possess highly diagnostic characteristics (this remains to be investigated). Only two formal stone tool 'types' were identified from the excavation: a fragment of 'edge-ground axe' from XU5 (1100-1450BP), and a 'burren adze slug' from XU4 (700-1100BP). Given their low numbers, however, it is difficult to make any generalisation about typological change in the stone tool assemblage from the site. It may nevertheless be significant to note that the 'burren adze' found at Hearth Cave was dated to around the same time as their appearance in other sites excavated from south-east Cape York Peninsula (David, in prep.).

The temporal distribution of in situ ochre is similar to the distribution of other types of cultural items. Numbers of ochre fragments peak during the last 3500 years, and high levels are maintained until ethnohistoric times. The very low ochre deposition rates before approximately 3500BP are likely to signify that the cave paintings currently visible at the site post-date this time, although the excavations have furnished no

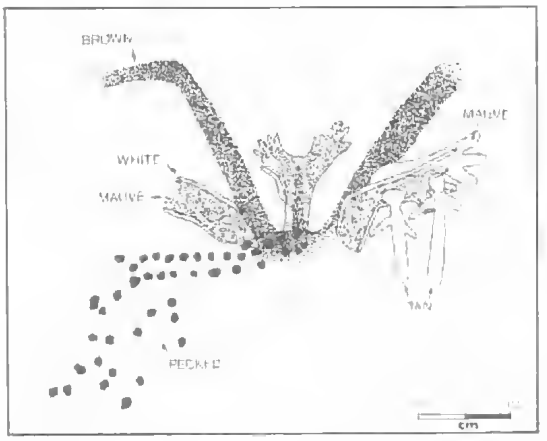

FIG. 15. Hearth Cave, freehand recording of part of the main painted and pecked panel. Not to scale.

direct indication of the age(s) of the underlying – and therefore older – peckings.

The increases in deposition rates documented from Hearth Cave after 3500BP include the following: 1, Increased sedimentation rates, which Hughes (1977) and Hughes & Lampert (1982) have argued may be related to increases in occupational intensities; 2, Increases in the deposition rates of bone, charcoal and burnt earth, which together may imply increased rates of hearth establishment and firing activity, and increases in the amounts of food consumed and discarded at the site; and 3, Increases in ochre, which implies an increase in painting activity.

It is, nevertheless, difficult to determine further the exact characteristics of the temporal frameworks involved. This is due to an absence of fine stratigraphy at the site, making it difficult to obtain discrete temporal units which can then be used to construct a chronological framework. Consequently, we have resorted to the use of a depth-age curve to calculate temporal trends. Furthermore, the availability of three dates from 2360±70 to 4100±120BP has enabled a fairly good assessment of changes around this time.

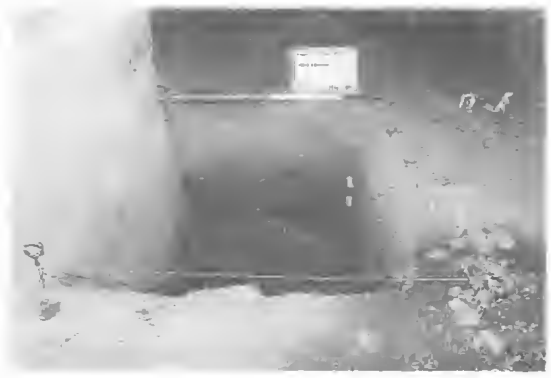

FIG. 16. Hearth Cave, the excavation pit, showing the west section (scale in 5cm units).

DISCUSSION

The distribution of in situ ochres at Mordor Cave and Hearth Cave is comparable to their distributions in other excavated sites from southeast Cape York Peninsula. In all sites, peak ochre deposition rates occur late in the sequence and continue to increase until very recent times. This is the case for the following:

1, the Early Man rockshelter, where in situ ochres increase significantly after either 5000BP or during the last two millennia or so (the precise dating is debatable because of chrono-stratigraphic uncertainties) (Rosenfeld et al., 1981; David, 1991b);

2, Green Ant Rockshelter (Koolburra Plateau), where they increase dramatically after 2500BP (Flood & Horsfall, 1986; Flood pers. comm., 1991);

3, Mitchell River Cave (Mitchell River), where the only fragment of ochre was obtained from deposits dating to the last 1000 years (David, 1991a);

4, Echidna's Rest (Chillagoe), where ochre deposition rates double after 3000 years ago, and continue to increase during the last 700 years (David, 1990).

The implications of this are that cave paintings in southeast Cape York Peninsula pertain particularly to the mid to late Holocene. Painting conventions vary greatly across space throughout southeast Cape York Peninsula, indicating a highly regionalised social landscape during this

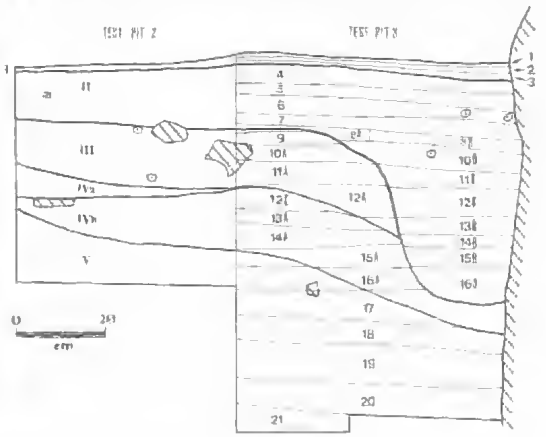

FIG. 17. Hearth Cave, stratigraphy, east section.

TABLE 12. Hearth Cave: deposition rates by XU (per m^2 per 100 years). Note that rates could not be calculated for XUs below XU15a, as no radiocarbon determinations were obtained from the lower XUs.

XU	SU	1	2	3	4	5	6	7	8	9	10	11	12
1	1	200	80.0	67.1	74.5	56.4	235.3	8.0	6.0	22.7	47.8		0.9
2	1	600	96.4	30.7	48.2	11.5	162.7	9.2	8.7	40.7	57.4		0.9
3	1	700	170.9	125.1	87.3	25.5	193.1	4.4	13.8	81.1	104.7	146.9	0.9
4	2	1100	94.4	72.7	65.7	19.2	101.3	8.8	8.4	43.0	39.4		0.9
5	2	1450	125.9	58.8	84.7	98.3	139.4	2.8	13.9	49.7	9.9	72.4	0.9
6	2	1800	95.2	27.4	75.1	33.4	111.2	5.8	13.4	52.6	24.0		0.9
7	2	2100	130.8	37.7	49.1	10.9	86.8	1.6	13.0	57.4	6.5		0.9
8a	2/3	2150	1006.5	332.9	335.5	78.7	483.9	11.6	59.4	340.6	63.2		0.9
9	3	2500	254.0	156.6	109.3	87.8	483.2	2.1	11.6	38.4	16.6		0.9
10a	3	2700	100.0	281.8	94.1	50.6	603.5	4.1	7.1	19.4	6.5		1.9
11a	3	3000	108.9	200.7	133.3	178.2	421.1	2.9	4.9	19.6	35.8		1.5
12a+c	3/4b	3500	70.0	124.1	64.3	49.4	299.0	4.6	8.1	13.6	5.3		1.5
13a	3/4b	3850	38.0	28.4	36.5	12.2	99.1	3.2	2.9	6.2	0.8		0.9
14a	4b	8250	0.3	<0.1	0.2	<0.1	2.1	<0.1	0.2	0.1	<0.1		0.1
15a	4b/5	17450	0.2	<0.1	0.1	<0.1	0.8	<0.1	0.1	0.1	<0.1		0.1

1=end years BP for spit 2=stone artefacts (#); 3=stone artefacts (g); 4=ochre (#); 5=ochre (g); 6=bone (g); 7=mussel shell (g); 8=egg shell (g); 9=charcoal (g); 10=burnt earth (g); 11=burnt stone (g); 12=sedimentation (cm).

time (e.g. Rosenfeld, 1982, 1984; David & David, 1988). Considerable support for these findings have been obtained for very recent times from the ethnographic record. More problematic is an apparent, more homogeneous engraving tradition characterised by non-figurative and animal track peckings throughout the region (see Maynard, 1977, 1979). Their probable greater antiquity and relative homogeneity may imply that inter-regional networks were structured differently during earlier times (before the mid Holocene?), although this issue needs to be further investigated by obtaining more secure dates on the engravings themselves. Nevertheless, the repeated occurrence of engravings *underneath* paintings at Laura, the Koolburra Plateau, Chillagoe and elsewhere, indicates that this temporal pattern has so far withstood the test of time (cf. Flood, 1987; Rosenfeld et al., 1981; Woolston & Trezise, 1969). The conclusion that the last few thousand years of prehistory in southeast Cape York Peninsula witnessed a fundamental restructuring of artistic, and therefore probably also socio-cultural, networks appears to be strengthened with every excavation adding further support for a largely late Holocene antiquity of cave paintings. The highly regionalised nature of these paintings contrasts markedly with the relatively homogeneous nature of the preceding engravings.

Related to this question, it is noted that a significant proportion of the excavated faunal remains from Mordor Cave consist of food debris dominated by macropods — *Petrogale* sp., *Macropus agilis* and *Macropus robustus* — and other marsupials (e.g. *Trichosurus vulpecula*). The total absence of macropods from the paintings, and the general non-conformity between the range and relative representation of fauna recovered from the excavations and those represented in the paintings may be of great interest. The implications are that the animals painted on cave walls during the mid to late Holocene are not simply a reflection of dietary breadth, nor simply an indication of the symbolic importance of the hunted and foraged fauna. On the contrary, the two sources of faunal representation — the painted animals and the animals represented in the food debris — represent two distinct information domains, each of which relates to a different set of socio-cultural principals (set within a socio-cultural system or systems). In other words, data obtained from the excavated food remains relates specifically to subsistence behaviour, whereas the painted forms are an archaeological window into a totally different aspect of prehistoric life within a site and region. By investigating the latter we are investigating a system of visual forms structured by socio-cultural convention, a system of symbols whose investigation can reveal something about the nature of symbolic vocabularies but not about their related original meaning contents (cf. Frost et al., 1992). Although rock art has largely been ignored in Australian archaeology until recent times, it is important to note that once different bodies of rock art from a single region (and across space) are dated, continuities and discontinuities in visual conventions can be investigated. This does not require the art having had 'meaning' to its creator in the sense that it was created for a particular reason beyond 'art for art's

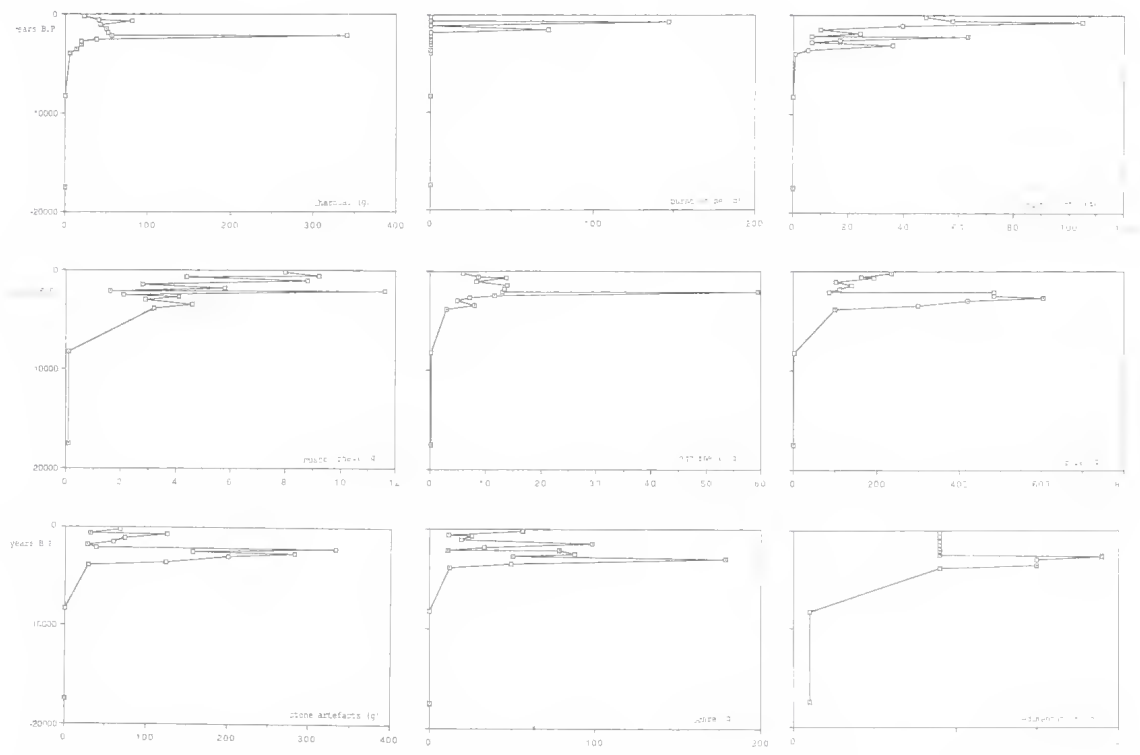

FIG. 18. Hearth Cave, deposition rates by XU (per m^2/100 years). Rates for SU5 are maximum rates only, based on the assumption that cultural deposits began 21,500BP. In reality, this is only a minimum date for occupation. Therefore, the temporal trends evident in the curves would be accentuated with longer occupation at the site.

sake', for what is at stake concerns the structuring of socio-cultural imagery, of the ordering of symbols as formal representations and of the portrayal of rock art forms in specific proportions. For example, why are there no recorded macropods in the Mitchell-Palmer rock paintings, especially given their importance in the rock art of Laura to the immediate north? Why does the nature of painted representations change less than 50km to the south of the Mitchell-Palmer region, from a predominantly figurative painting region to a non-figurative one? The implications are that during relatively recent times at least, spatial discontinuities existed in the distribution of socio-cultural conventions relating to rock art through space (David, in prep.). Given that rock art does not necessarily relate to any specific aspect of social life such as subsistence, however, it does not necessarily follow that the documented discontinuities in rock art also represent differences in other social practices. But the regionalised nature of rock art traditions during the late

TABLE 13. Hearth Cave: deposition rates by SU (per m^2 per 100 years). Note that some XUs are interface spits, and therefore their relative contributions to the various SUs to which they belong have been taken into account in the calculations presented.

SU	XUs	1	2	3	4	5	6	7	8	9	10	11	12
1	1-3	700	102.3	54.6	61.3	26.2	187.7	8.2	8.7	41.4	61.3	21.0	206.5
2	4-8a	2150	242.2	61.4	104.7	42.0	146.5	6.4	26.8	66.0	22.9	17.5	237.5
3	8a-13a	3450	195.2	210.7	128.2	103.9	516.0	5.1	12.0	33.2	17.6		1731.6
4b	12c-17	?9000	12.0	2.4	6.2	2.4	19.2	0.4	0.9	1.3	0.3		117.4
5	15a-21	>21,500	<1.8	<0.1	<1.3	<0.3	<0.9	<0.1	<0.1	<0.1	<0.1		<11.3

1=end years BP 2=stone artefacts (#); 3=stone artefacts (g); 4=ochre (#); 5=ochre (g); 6=bone (g); 7=mussel shell (g); 8=egg shell (g); 9=charcoal (g); 10=burnt earth (g); 11=burnt stone (g); 12= land snail (g).

Holocene implies regionalised symbolic behaviour throughout southeast Cape York Peninsula during that time. The precise nature of this regionalisation — whether it involved broader discontinuities or not — remains unknown. It is therefore to explore such issues that we present this paper, for it is by generating systematic research on past socio-cultural systems in southeast Cape York Peninsula — that is, on the relationship between resource structures, symbolic representations, technological conventions etc., and their continuities and discontinuities across space and through time — that significant new inroads will be made in Aboriginal prehistory.

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LITERATURE CITED

CHILLAGOE CAVING CLUB 1988. 'Mitchell-Palmer Karst: a speleological field guide for the towers and caves of the Mitchell-Palmer areas in Far North Queensland, Australia'. (Chillagoe Caving Club Inc.: Cairns).

DAGG, L. 1992. 'Interpreting faunal remains: a taphonomic analysis of two late Holocene faunal assemblages from southeast Cape York Peninsula'. (Unpublished BA Hons thesis, University of New England, Armidale).

DAVID, B. 1990. Echidna's Rest, Chillagoe: a site report. Queensland Archaeological Research 7: 73-94.

1991a. Mitchell River Cave: a late Pleistocene-Holocene sequence from southeastern Cape York Peninsula. Australian Aboriginal Studies 1991 (2): 67-72.

1991b. Fern Cave, rock art and social formations: rock art regionalisation and demographic models in southeastern Cape York Peninsula. Archaeology in Oceania 26: 41-57.

DAVID, B. & DAVID, M. 1988. Rock pictures of the Chillagoe- Mungana limestone belt, north Queensland. Rock Art Research 5(2): 147-56.

FLOOD, J. 1987. Rock art of the Koolburra Plateau, north Queensland. Rock Art Research 4 (2): 91-126.

FLOOD, J. & HORSFALL, N. 1986. Excavation of Green Ant and Echidna shelters. Queensland Archaeological Research 3: 4-64.

FROST, R., DAVID, B. & FLOOD, J. 1992. Pictures in transition: discussing the interaction of visual forms and symbolic contents in Wardaman rock pictures. Pp. 27-32. In Morwood, M. & Hobbs, D. (eds), 'Rock Art and Ethnography'. (Australian Rock Art Research Association: Melbourne).

HUGHES, P.J. 1977. 'A geomorphological interpretation of selected archaeological sites in southern coastal New South Wales'. (Unpublished PhD thesis, University of New South Wales, Sydney).

HUGHES, P.J. & LAMPERT, R. 1982. Prehistoric population change in southern coastal New South Wales. Pp. 16-28. In Bowdler, S. (ed.), 'Coastal Archaeology of Eastern Australia'. (Australian National University: Canberra).

JOHNSON, I. 1979. 'The getting of data'. (Unpublished PhD thesis, Australian National University, Canberra).

LOURANDOS, H. 1983. Intensification: a late Pleistocene-Holocene archaeological sequence from southwestern Victoria. Archaeology in Oceania 18: 81-94.

MAYNARD, L. 1977. Classification and terminology of Australian rock art. Pp. 403-413. In Ucko, P. (ed.), 'Form in Indigenous Art: schematisation in the art of Aboriginal Australia and prehistoric Europe'. (Australian Institute of Aboriginal Studies: Canberra).

1979. The archaeology of Australian Aboriginal art. Pp. 83-100. In Mead, S.M. (ed.), 'Exploring the Visual Arts of Oceania'. (University of Hawaii Press: Honolulu).

ROSENFELD, A. 1982. Style and meaning in Laura art: a case study in the formal analysis of style in prehistoric art. Mankind 13: 199-217.

1984. The identification of animal representations in the art of the Laura region, north Queensland

(Australia). Pp.399-422. In Bandi, H.-G. (ed.), 'La Contribution de la Zoologie et de l'Ethologie a l'Interprétation de l'Art des Peuples Chasseurs Préhistoriques'. (Editions Universitaires: Fribourg).

ROSENFELD, A., HORTON, D. & WINTER, J. 1981. 'Early Man in North Queensland'. (Australian National University: Canberra).

WOOLSTON, F.P. & TREZISE, P. 1969. Petroglyphs of Cape York Peninsula. Mankind 7: 120-27.